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Western Europe's Major Oil and Gas Producers: Rethinking Energy Policy

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An Intelligence Assessment

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An Intelligence Assessment

This paper was prepared by [redacted]
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**Western Europe's Major
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Key Judgments

*Information available
as of 15 August 1984
was used in this report.*

Thanks mainly to production from the United Kingdom, Norway, and the Netherlands, Western Europe currently is able to produce domestically 85 percent of its natural gas needs and about three-tenths of its oil requirements. The governments of all three countries have maintained ultimate control over oil and gas development, and all have sought to extract as much tax revenue as possible from the energy sector. In other respects, however, their policy approaches have differed:

- The United Kingdom generally has followed a rapid development policy, seeing oil and gas production as an important prop for a weak economy.
- Norway initially took a go-slow approach for fear of disrupting its small economy, although strategy recently has shifted toward boosting the pace of development.
- The Netherlands began by stressing rapid development and depletion of its gas reserves, in large part to fund government welfare spending. After the 1973/74 oil crisis, policy became much more conservationist—to the point of banning new export contracts—but has once again turned less restrictive in the last few years.

We judge that oil and gas production has had a net positive impact on the economies of all three countries, although there have been clear negatives as well. The most obvious common benefit has been the large contribution to export earnings and government revenue. Energy production also appears to have given a strong boost to GNP growth in Norway and a smaller boost to growth in the other two—larger—economies. The principal drawback of expanding energy production in all three countries has been the negative impact on the manufacturing sector—mostly due to exchange rate appreciation induced by the improvement in the energy trade balance.

Western Europe will remain dependent on imports for close to half of its total energy supply through the end of the century and beyond. In particular, the region's critical dependence on imported oil—primarily from the Middle East—will continue. Although this dependence has declined dramatically over the last decade—from 59 percent of total energy consumption to 32 percent—it remains high, and it may increase somewhat after 1990. Oil production increases in Norway probably will not offset declines in the United Kingdom while oil consumption could begin to pick up again, due to economic growth and the fall in real oil prices since 1980.

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Gas import dependence definitely will rise even if no more Soviet deals are signed. In 1990 gas imports will account for about 30 percent of gas consumption and 5 percent of total energy consumption with three-fourths of these imports coming from the USSR as the new Soviet pipeline goes into full operation. There is little doubt that Moscow will be willing and able to supply additional gas—building more pipelines if necessary—and will be able to undercut the prices offered by alternative suppliers. While the West Europeans do not really want to take this route, we believe they would prefer additional Soviet gas either to much higher priced domestic gas or to increased reliance on OPEC. Although another pipeline would boost Soviet gas's share of energy consumption above 5 percent, the West Europeans would probably argue that this would be offset by a decline in their imports of Soviet oil.

Norway's giant Troll field is Western Europe's only real hope of covering its future gas needs from indigenous sources. While the oil companies are confident that the technical problems of developing a field in 300-meter water depths can be overcome, it will take more than a decade of work to achieve full production. Thus, even if development began now, it would be near the turn of the century before Troll could make a major contribution to West European gas supplies. Moreover, full-scale development will not begin until there is a firm contract for the gas; active negotiations with gas-buying companies on the Continent are not yet under way, although they are scheduled to begin in 1985.

In our view, the key to reaching agreement on the sale of Troll gas will be Norwegian marketing flexibility. If the gas price is to be low enough to attract buyers, we believe Oslo will have to implement a less burdensome tax system for Troll, thus bearing more of the risk associated with an uncertain energy market. Even with an easier tax regime, Oslo would still garner substantial revenue from Troll, and if energy prices rise as expected in the 1990s it could reap huge proceeds. We think that this fact, coupled with the fear that Troll gas could be shut out of the West European market if development does not begin soon, could push Oslo to compromise on the issue.

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Scope Note

Probably the most critical energy issue facing Western Europe is the extent to which the region's oil and gas import dependency will worsen over the next 10 to 15 years. A key factor in determining the eventual outcome of this issue will be the policy decisions made by the United Kingdom, Norway, and the Netherlands—the main oil and gas producers in the area. This paper is intended to fill gaps in previous analyses by providing a fairly detailed study of the evolution of energy policy in these three countries, in the hope that this will shed some light on the most likely future course of policy.

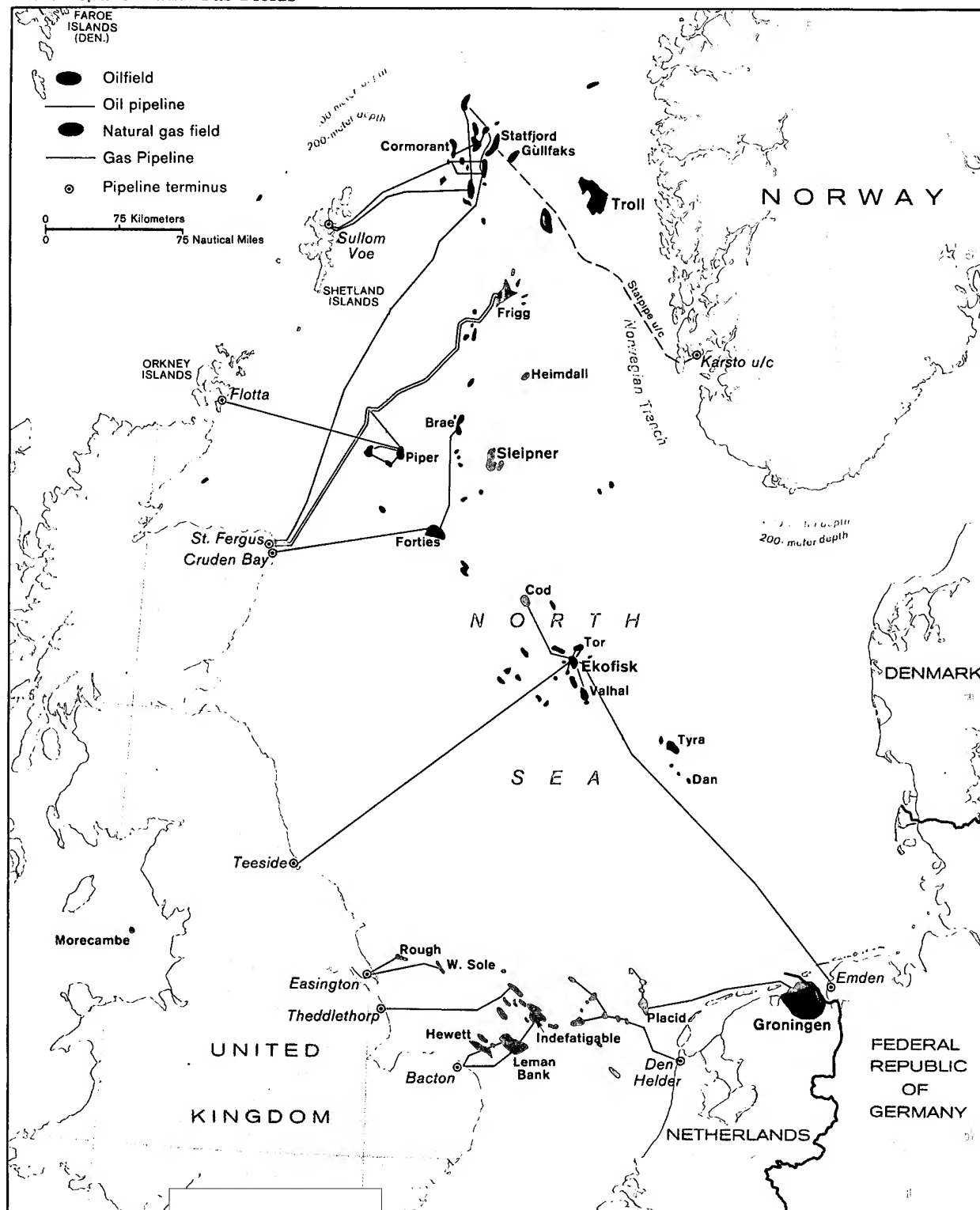
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North Sea Oil and Gas Fields



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Western Europe's Major Oil and Gas Producers: Rethinking Energy Policy

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The Resource Base

Most of Western Europe's oil and gas reserves lie either on the Dutch mainland or in two large sedimentary basins on the North Sea Continental Shelf (NSCS). Roughly 90 percent of oil and gas reserves are held by the United Kingdom, Norway, and the Netherlands. Holland's giant onshore field at Groningen by itself contains about 30 percent of the region's proved gas reserves. Offshore, the shallow southern basin of the North Sea stretches from the Netherlands to the United Kingdom and contains mostly deposits of natural gas. The deeper northern basin, extending from southern Norway to Scotland and the Shetland Islands and then north into the Barents Sea, contains large deposits of oil and gas. Water depths in the southern basin generally do not exceed 90 meters, while the rich Norwegian trench lying in the northern basin parallel to the southern coast of Norway has water depths that often exceed 300 meters.

Most of the offshore oil and gas is shared by Norway and the United Kingdom. Britain's offshore acreage includes nearly half of the area available for drilling in the NSCS and contains 60 percent of known oil reserves and 32 percent of known gas reserves in the North Sea. Norway holds 25 percent of the area, with 35 percent of the oil reserves and 53 percent of the gas reserves. Norway also lays claim to large unexplored areas of the Norwegian Sea and the Barents Sea, which are believed to contain rich deposits of oil and gas. The Netherlands and Denmark each hold 10 percent of the acreage in the NSCS. The Dutch have 9 percent of known gas reserves and 2 percent of the oil, while Denmark accounts for 6 percent of the gas and 3 percent of the oil. France, West Germany, Belgium, and Ireland hold the remainder of the acreage but have not yet located significant quantities of oil or gas.

While West European oil and gas reserves are small relative to total world supplies, they are significant in terms of West European energy needs. Proved West

European oil reserves totaled about 23 billion barrels in January 1984, equivalent to six years of the region's oil consumption at current rates. Proved gas reserves at the same time were about 4,500 billion cubic meters (bcm), or 27 billion barrels of oil equivalent, equivalent to about 21 years of gas consumption at current rates. Currently, West European production covers about 85 percent of the region's gas requirements and about three-tenths of its oil needs.

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Production and Consumption Trends for Oil and Gas ¹

Western Europe is critically dependent on imported energy. The key dependency, and the one most troubling to West European policymakers, is on OPEC oil. This situation worsened considerably from 1960 to 1973 because West European oil consumption more than tripled, while domestic production remained negligible. More recently, Western Europe has begun to step up its imports of natural gas, particularly from the USSR.

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Western Europe's energy dependence would be even worse, were it not for the increased energy production in the United Kingdom, Norway, and the Netherlands, coupled with substantial gains in energy conservation in the wake of the OPEC price hikes. From 1973 to 1983 these three countries boosted their combined oil and gas production from 1.7 million barrels per day of oil equivalent (b/doe) to 5.4 million b/doe, while West European oil and gas consumption dropped from 17.4 million b/doe to 15.1 million

¹ Data through 1982 are from *Energy Balances of OECD Countries*. Production numbers include natural gas liquids, and consumption numbers include bunkers. Originally expressed in million tons of oil equivalent, figures have been converted into barrels of oil equivalent or cubic meters of gas using 1 ton = 7.3 barrels and 16,700 b/doe = 1 billion cubic meters per year. 1983 data are estimated.

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Table 1
Western Europe: Estimates of Remaining Proved
Oil and Gas Reserves, January 1984

Country	Total Oil and Gas (million barrels of oil equivalent)	Oil (million barrels)	Gas	
			(million barrels of oil equivalent)	(billion cubic) meters)
Total	50,626	23,390	27,236	4,465
Norway	17,816	7,660	10,156	1,665
United Kingdom	17,487	13,150	4,337	711
Netherlands	8,953	309	8,644	1,417
Italy	1,550	800	750	123
West Germany	1,481	304	1,177	193
Denmark	824	324	500	82
Greece	649	51	598	98
France	561	140	421	69
Turkey	547	370	177	29
Spain	544	160	384	63
Austria	214	122	92	15

Source: *Oil and Gas Journal*.

b/doe. Net imports of oil and gas covered 59 percent of the region's total energy requirement in 1973 but only 35 percent in 1983. Looking at oil alone, imports covered 97 percent of consumption at the beginning of the period compared with 70 percent at the end.²

Production

Although the Netherlands, the United Kingdom, and Norway are now dominant, Western Europe has for many years obtained modest amounts of oil and natural gas production from other countries in the region. In particular, France, Italy, and West Germany traditionally have covered a significant, though declining, share of their natural gas needs from domestic production, while a number of countries produce small amounts of oil.

The Smaller Producers. Taken as a group, in 1970 these other countries produced about 360,000 barrels per day (b/d) of oil and 580,000 b/doe (35 bcm) of

natural gas, covering a little over 4 percent of Western Europe's total energy requirement. By 1983 oil production in these other countries was up slightly to 390,000 b/d, gas production was up to 680,000 b/doe (41 bcm), and the combined total once again covered somewhat more than 4 percent of Western Europe's total energy requirement.

The Netherlands. The Netherlands began to emerge as a significant energy producer in the 1960s, following the discovery of the Groningen gasfield in 1959. Gas production grew slowly at first—despite The Hague's policy of rapid development—reaching only 24,000 b/doe (1.4 bcm) by 1965. The pace accelerated rapidly during the following decade, as production reached 490,000 b/doe (29 bcm) in 1970 and peaked at 1.5 million b/doe (90 bcm) in 1976. Output fell sharply during 1979-82, however—from 1.44 million b/doe (86 bcm) to 1.11 million b/doe (66 bcm)—as higher prices and the recession cut into demand.

² The dependency figures for 1983 are, however, somewhat understated because energy consumption in that year was reduced below normal levels by the economic recession.

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Table 2
Western Europe: Oil and Gas Production
and Consumption ^a

*Million barrels per day of
oil or oil equivalent*

Consumption		Production				Production as Percent of Consumption
		Total	United Kingdom	Netherlands	Norway	
Oil						
1970	12.58	0.40	NEGL	0.04	0	3.2
1971	13.12	0.38	NEGL	0.03	0.01	2.9
1972	14.05	0.39	NEGL	0.03	0.03	2.8
1973	14.96	0.39	NEGL	0.03	0.03	2.6
1974	14.01	0.40	NEGL	0.03	0.04	2.8
1975	13.14	0.56	0.01	0.03	0.19	4.2
1976	14.11	0.84	0.25	0.03	0.28	6.0
1977	13.82	1.36	0.78	0.03	0.28	9.8
1978	14.26	1.77	1.11	0.03	0.34	12.4
1979	14.48	2.28	1.57	0.03	0.40	15.8
1980	13.49	2.48	1.62	0.03	0.53	18.4
1981	12.42	2.64	1.81	0.03	0.50	21.3
1982	11.86	3.00	2.09	0.04	0.52	25.3
1983 ^b	11.49	3.44	2.30	0.06	0.61	29.9
Gas						
1970	1.28	1.26	0.19	0.49	0	97.8
1971	1.67	1.62	0.32	0.68	0	97.3
1972	2.14	2.04	0.46	0.90	0	95.7
1973	2.45	2.33	0.50	1.10	0	94.9
1974	2.80	2.64	0.60	1.30	NEGL	94.5
1975	2.97	2.74	0.63	1.40	NEGL	92.1
1976	3.21	2.89	0.66	1.50	0.01	90.0
1977	3.30	2.94	0.69	1.49	0.05	89.2
1978	3.43	3.00	0.67	1.37	0.24	87.5
1979	3.64	3.23	0.67	1.44	0.39	88.6
1980	3.57	3.18	0.64	1.40	0.47	89.1
1981	3.51	3.11	0.64	1.30	0.47	88.6
1982	3.40	2.90	0.65	1.11	0.46	85.2
1983 ^b	3.59	3.04	0.72	1.18	0.46	84.5

^a OECD data, converted from million tons of oil equivalent at 1 ton=7.3 barrels. Consumption figures include bunkers; production figures include natural gas liquids.

^b Estimated.

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The discovery of the Groningen gasfield suggested the probability of substantial offshore reserves, but an active search did not begin until 1964. Development was delayed in the first instance by the fact that the 1958 Geneva agreement (the Continental Shelf Convention) had not been ratified. In addition, the harsh climatic and sea conditions, the lack of adequate deepwater drilling technology, and the high cost of offshore projects contributed to the slow start. []

The United Kingdom. Following offshore discoveries of gas in 1965 and oil in 1969, Great Britain has emerged as Western Europe's leading energy producer. Gas production—including some onshore fields—came first, reaching 190,000 b/doe (11 bcm) by 1970, 600,000 b/doe (36 bcm) in 1974 and 720,000 b/doe (43 bcm) last year. Oil production was negligible until 1976 when it jumped to 250,000 b/d. Output thereafter expanded very rapidly, with average production passing 1 million b/d in 1978 and 2 million b/d in 1982. Oil production this year should average 2.6-2.7 million b/d, but this is probably close to the maximum attainable, and output is likely to begin declining after 1985. []

Norway. Due to Oslo's go-slow approach and the sluggish pace of early discoveries, Norwegian oil and gas production did not begin until 1971 and 1974, respectively. As of 1975 gas production was still negligible while oil output totaled only 190,000 b/d. Production of both commodities expanded rapidly from 1975 to 1980. Gas output then leveled off at about 460,000 b/doe (28 bcm). Oil production also flattened out for two years but began rising again late in 1982 and should average better than 700,000 b/d this year. []

Mainly reflecting developments in these three countries, West European oil production has soared from 390,000 b/d in 1973 to about 3.4 million b/d in 1983. The United Kingdom provided 69 percent of the 1983 total and Norway, 18 percent. Meanwhile, West European gas production grew from 2.3 million b/doe (140 bcm) in 1973 to 3.2 million b/doe (193 bcm) in 1979. Output then fell for three straight years before recovering slightly to 3.0 million b/doe (182 bcm) last year. The Netherlands accounted for 39 percent of the 1983 total; the United Kingdom, 24 percent; and Norway, 15 percent. []

Consumption

West European oil consumption soared at a 12-percent annual rate during the 1960s, reflecting both rapid economic growth and the declining real price of oil on world markets. Consumption continued to grow at 6 percent annually during the early 1970s, reaching a peak of 15.0 million b/d in 1973. Use of natural gas expanded even more rapidly—due mainly to the increasing supply of Groningen gas—but from a much lower base; it reached about 2.4 million b/doe (147 bcm) in 1973. In the latter year, oil covered over three-fifths of Western Europe's total energy requirement, while natural gas covered one-tenth. []

West European consumption of oil has declined 23 percent since 1973 to 11.5 million b/d in 1983, with most of the drop taking place after 1979. The largest single reason for the decline probably is the switch to other fuels—coal, gas, and nuclear power—in the wake of the 1973 and 1979 OPEC price hikes, but energy conservation, mild weather, and the recent recession have also had a significant impact. Gas consumption followed a different pattern, initially expanding by about one-half to a peak of 3.6 million b/doe (218 bcm) in 1979. This gain mainly reflected the advantage that gas had gained vis-a-vis oil, both in terms of price and security of supply. Consumption receded to 3.4 million b/doe (204 bcm) in 1982, because of rising gas prices and the recession, before recovering to 3.6 million b/doe (215 bcm) last year. []

Oil and Gas Import Dependence

These trends in energy production and consumption have dramatically reduced Western Europe's dependence on outside oil and gas suppliers—particularly OPEC. In 1973 imports of OPEC oil covered 54 percent of Western Europe's total energy consumption; last year this figure was down to 23 percent. Over the same period, West European dependence on oil imports from all outside sources fell from 59 percent of total energy consumption to 32 percent. Although gas imports rose sharply during this period, they still accounted for less than 3 percent of total

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Table 3
Western Europe: Oil and Gas Import Dependence

Percent

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Net oil imports as a share of total energy consumption											
Total	58.7	57.1	52.0	53.4	49.6	47.8	47.5	43.7	37.5	34.9	31.6
OPEC	54.4	53.0	45.5	46.2	43.5	40.3	41.3	37.1	30.6	26.9	22.6
Of which:											
Algeria	3.0	2.1	2.2	1.7	1.6	1.5	1.6	1.5	1.1	2.3	2.1
Libya	6.7	4.9	3.4	4.4	3.8	3.2	3.7	3.4	2.8	3.7	3.7
Nigeria	3.6	4.4	3.3	2.9	2.5	3.0	3.4	3.3	1.9	2.2	2.6
Kuwait	6.3	4.4	3.3	2.8	2.7	3.2	3.5	2.0	1.1	0.7	1.0
Saudi Arabia	15.3	17.0	13.5	13.9	14.3	11.4	14.2	15.0	15.8	9.4	4.8
Iran	8.3	9.6	8.6	9.8	8.0	7.9	3.2	1.7	1.3	3.4	3.5
Iraq	4.5	4.3	5.3	4.9	5.0	5.2	6.6	5.1	1.8	1.7	1.5
USSR	3.3	2.8	3.5	4.4	4.8	5.0	4.6	4.3	4.3	5.6	6.2
Eastern Europe	0.4	0.4	0.6	0.8	0.8	0.6	0.9	1.4	1.1	1.1	1.3
Other	0.6	0.9	2.5	2.1	0.6	1.9	0.6	0.9	1.4	1.3	1.5
Net gas imports as a share of total energy consumption											
Total	0.6	1.1	1.3	1.8	1.8	1.7	2.1	2.3	2.5	2.8	
USSR	0.3	0.7	0.9	1.3	1.4	1.5	1.7	1.9	1.8	1.8	
Algeria	0.2	0.2	0.3	0.2	0.2	0.1	0.3	0.4	0.6	0.9	
Libya	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.0	0.1	0.1	

energy consumption in 1983. Oil and gas imports from the Soviet Union have increased, however, and the USSR is now the largest outside supplier of both commodities. Last year imports of Soviet oil and gas covered 6.2 percent and 1.8 percent, respectively, of total energy consumption.

Oil and Gas Policy

Norway, the United Kingdom, and the Netherlands have taken somewhat different approaches to energy policy, although all have accepted as a basic principle that government should maintain extensive control of oil and gas development. The differences in policy stem largely from the economic conditions that existed when resources were first developed. The United Kingdom entered the energy era with a faltering

economy characterized by sluggish economic growth, recurring balance-of-payments problems, rising budget deficits, and underinvestment in aging industries. Oil revenues were seen by governments from both major parties as a means of saving the economy, and London consequently has followed a policy of rapid development. Norway, on the other hand, had a strong economy, a small, homogeneous population, and an abundant supply of hydroelectric power. In this situation, planners were concerned about the impact of rapid oil and gas development on the social structure, the environment, and the economy and thus initially took a go-slow approach—although strategy recently has shifted toward boosting the pace of

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development. The Netherlands was in a rather different situation: although economic conditions were generally good, the government was embarked on building an extensive social welfare system; revenue from gas production seemed to offer a relatively painless way of financing the costs. As a result, The Hague began with a policy of rapid development but shifted to a much more conservationist approach in the wake of the 1973 oil price hikes. [redacted]

The United Kingdom

In our view, British policy toward the development of oil and gas resources over the past two decades can be summarized as follows:

- Resources should be used to provide maximum benefits for the country as a whole.
- To ensure this, ultimate control of the resources should remain in the hands of the government.
- Resources should be developed as quickly as possible (although recognizing that at some point government depletion controls might be desirable).
- The government should collect as much revenue from oil and gas as is possible without slowing the pace of development. [redacted]

The foundations of British energy policy go back to the 1934 *Petroleum Act*, which vests all oil resources in the Crown. Control of gas operations was given to the government by the 1945 *Ministry of Fuel and Power Act*, which also gave to the Ministry the broad task of securing effective and coordinated development of fuel and power in the United Kingdom. The 1964 *Continental Shelf Act* established government control of offshore resources, essentially by extending the two earlier laws to include offshore areas. In addition, it ratified the boundaries allocated by the 1958 Geneva convention and established a system of royalties and taxation for oil and gas development. [redacted]

Development Policy. During the first decade of exploration and development activity on the United Kingdom's continental shelf (1964-73), governments from both major parties sought to exploit oil and gas as quickly as possible. This approach was explicitly confirmed in the 1967 *Fuel Policy White Paper*, which concluded that the advantages of rapid development outweighed the disadvantages. In general the

British authorities' view was that oil and gas production would add to GNP, improve the balance of payments, and reduce budget deficits. They also tended to believe that the value of oil and gas would be eroded in the future as alternative forms of energy became available. As a result, several large North Sea licensing rounds were held, and an important criterion for awarding licenses was the number of exploratory wells the applicant promised to drill. In addition, a relatively easy fiscal regime was introduced to encourage exploration and development. [redacted]

British policy experienced a moderate transformation during 1973/74 as a new consensus emerged that, at some future time, the government might need to limit oil production. The prevailing view was that depletion controls should not be considered at least until oil self-sufficiency had been attained, although the Scottish Nationalist Party advocated setting a production ceiling of 1 million b/d—about half the British level of consumption. This shift in thinking began in early 1973 under the Conservative government and was prompted by large offshore oil discoveries, which aroused fears that oil production might eventually be large enough to have negative effects. The OPEC price hikes later in 1973 reinforced this shift in attitude by vividly demonstrating that oil in the ground was not necessarily a declining-value asset. [redacted]

In March 1974 a Labor government was elected on a platform that included general references to the need for public control of oil and gas development. Shortly thereafter the 1974 *White Paper on United Kingdom Offshore Oil and Gas Policy* was published. It stated that the government would eventually control production levels, although for the next few years the goal was still to increase output as quickly as possible. This was very similar to the view of the Conservative Party, which in the same year proposed establishing an independent body to regulate the rate of depletion, starting in the 1980s. [redacted]

The oil companies were alarmed, however, by the new Secretary of State for Energy who stated that the government was taking a more conservationist stance

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and would seek a long-term balanced flow of oil rather than maximum development. Responding to protests by the oil companies, he later gave formal assurances that rapid development would be allowed to continue until at least 1980. These so-called Varley assurances were later extended—first to the end of 1982 and more recently to the end of 1984. []

The government's new stance was formalized in the *1975 Petroleum and Submarine Pipelines Act*. This gave London extensive power to set depletion rates (although the power probably was already there implicitly under the laws mentioned earlier). The Act requires producers to submit a development plan that includes projected minimum and maximum production rates. London can require changes in the plan and later can order the production rate to be raised or lowered, within these preset limits. An additional piece of legislation—the *Energy Act of 1976*—gave the government the authority to regulate the price and output of oil and gas if required to meet a national emergency or to satisfy EC or IEA requirements.

London's pledge not to impose depletion controls expires at the end of 1984, but this issue is no longer very important. Oil production is already very close to the maximum attainable and is expected to begin declining in two or three years. Anxious to avoid a sharp decline in oil output, the Thatcher government over the last several years has stepped up the pace of licensing and has significantly eased the tax burden on North Sea operations, particularly for the smaller fields where most of the undeveloped oil reserves now lie. []

Taxation. Over the years London basically has sought to gain as much revenue as possible from oil and gas operations, while still maintaining a rapid pace of development. The effort to reconcile these conflicting objectives has brought numerous changes in the tax laws during the past decade. As late as 1974 the United Kingdom had a simple and relatively unburdensome oil and gas tax regime consisting of a royalty fee and the standard corporation income tax. By the early 1980s the overall tax burden was much higher and the system was drawing much criticism for its complexity. []

From 1975 to 1982 the trend in taxes was sharply upward. The substantial oil discoveries of the early 1970s, coupled with the 1973 OPEC price hikes, made it evident that North Sea operations would generate enormous profits within a few years. It also became clear that the government would receive little revenue in the beginning because the oil companies had accumulated losses in other parts of the world that were deductible against North Sea profits in calculating their corporation income tax. As a result, Parliament passed the *1975 Oil Taxation Act*, which introduced the Petroleum Revenue Tax (PRT)—a levy on profits from each individual field, set initially at 45 percent. To reduce the impact on smaller, high-cost oilfields, the first 500,000 tons (20,000 b/d) produced in each six-month period were exempted from the tax, with a maximum lifetime exemption of 10 million tons per field. The 1975 act also introduced the unique "ring fence provisions" under which losses from operations outside Britain's continental shelf were no longer allowed as deductions for the corporation income tax. Effective in 1979, the PRT rate was increased to 60 percent, the tax allowance for capital expenditures was reduced, and the amount of oil exempted from PRT was cut in half. These moves reflected continued high company profits and London's need for greater revenues. Following the second round of OPEC price hikes, the PRT rate was hiked to 70 percent in 1980 and 75 percent in 1982. In addition, a further tax—the *Special Petroleum Duty (SPD)*—was levied as of 1981. []

In response to industry protests, falling oil prices, and forecasts of declining oil and gas production, London has significantly eased its tax regime during the past two years. It first allowed the SPD to lapse at the end of 1982, and then in mid-1983 implemented several measures that apply to offshore areas outside the southern North Sea (where extra development incentives were not considered necessary). Most importantly, the 12.5-percent royalty fee was abolished for new oil and gas fields. Because royalties are paid out of gross revenue—without regard to profitability—this

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Table 4
United Kingdom: Licensing Rounds

	1 (1964)	2 (1965)	3 (1970)	4 (1971-72)	5 (1976-77)	6 (1978-79)	7 (1980-81)	8 (1982-83)	9 (1984-85)
Number of blocks offered	960	1,102	157	436	71	46	95	184	180
Number of blocks applied for	394	127	117	286	51	46	97	84	NA
Number of blocks licensed	348	127	106	282	44	42	90	70	80 ^a
Number of companies licensed	53	44	61	213	64	59	157	NA	NA

^a Expected.

step was particularly significant for encouraging development of the smaller, high-cost fields on which the United Kingdom will increasingly have to rely. In addition, the volume of oil exempt from PRT was restored to its original level of 1 million tons annually per field. []

Partly as a result of these changes, drilling activity in the British North Sea had reached record levels by the fall of 1983. Many earlier finds are also being reappraised and development of as many as 17 small oilfields could begin by 1985. []

[] The volume of oil and gas reserves currently under development is still far below the 1976-77 peak, however. Because of the time required to develop a field, the new tax measures will have little effect on production—or on government revenue—before the 1990s. []

The Government's Role. The British Government's energy role begins with the fact that it lays claim to all oil and gas reserves in the country. It transfers rights to these resources by means of a licensing system. A few licenses have been auctioned to the highest bidder, but the great majority are awarded by administrative decision. The production license confers the right to drill wells and produce any hydrocarbons located and is valid for four years with an option for a further 20 years on the surrender of at least half of the original license area. []

In an effort to get North Sea development under way rapidly, two large licensing rounds were held in 1964 and 1965, with more than 2,000 blocks offered and 475 licensed. During the third and fourth rounds (1970-72) an additional 593 blocks were offered, of which 388 were licensed. With the most promising areas already taken, and with discoveries occurring rapidly, licensing slowed sharply thereafter. During 1973-79 only two rounds were held in which just 117 blocks were offered and 86 licensed. []

Licensing activity has picked up again since 1979 as part of London's effort to boost exploration and development. Under the seventh licensing round, 90 offshore blocks were licensed in 1981 and 70 more licenses were issued in early 1983, at the conclusion of the eighth round. A ninth round is currently under way, and London is expected to award about 80 licenses early next year. In August 1983 London also opened 30 onshore areas for production and seven areas for exploration and promised to review onshore licensing regulations. []

London also plays an energy role through several state companies. Although the Thatcher government has "privatized" the production activities of British National Oil Company (BNOC), the firm still performs

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an important marketing function. It is entitled to purchase up to 51 percent of the oil produced in the North Sea, at current official prices, under participation agreements signed by the companies as a licensing condition. BNOC also holds and distributes oil taken by the government as "payment in kind" for royalties. Government revenues from BNOC sales are placed in a special National Oil Account and are used to finance future acquisitions and operations of the company. Nearly all the gas produced domestically is marketed by British Gas Corporation, which controls the purchase price under long-term contracts with producers. In early 1983 the Thatcher government offered to sell most of its partial stake in British Petroleum—the country's largest oil company—to help cut its budget deficit. [REDACTED]

The government has also taken measures to ensure that British industry benefits from the oil bonanza. London requires that 60 percent of the oil produced be refined domestically. The Offshore Supplies Office, founded in 1972, is charged with identifying and promoting domestic suppliers for the goods and services used in both domestic and foreign oil and gas projects. This effort has been successful, as British firms' share of domestic contracts has risen to about 70 percent, compared with less than 10 percent in 1974, when most of the materials and services came from the United States. [REDACTED]

Norway

Of the three major West European energy producers, Norway has maintained the strictest control of its oil and gas resources. Oslo's energy policy is based on the *May 1963 Royal Decree*, which extended sovereignty to offshore areas, and the *June 1963 Exploration for and Exploitation of Submarine National Resources Act*, which vested power over resources in the state and gave the government control over licensing and regulation. Once formal guidelines had been announced and a tax regime decided, the first offshore licenses were awarded in 1965, and production began in 1971. [REDACTED]

The Go-Slow Policy. From the start, Oslo adopted a more conservative approach to offshore development than did London. This reflected, in part, the smaller size of the Norwegian economy (one-eighth the size of the United Kingdom's) and its lower level of energy

consumption (less than one-tenth of that in the United Kingdom), of which 40 percent was hydroelectric power. It also resulted from the more favorable economic conditions—relatively stable economic growth and absence of balance-of-payments crises—that Norway enjoyed. Rapid exploitation of North Sea energy reserves was seen as potentially injurious to the domestic economy and the established social order. In particular, Norwegian planners feared that faster development would lead to higher inflation, damage to the fishing industry and the environment generally, and industrial restructuring problems. [REDACTED]

Norway's "go-slow" policy became more explicit in the early 1970s when parliament passed a resolution limiting combined oil and gas production to 1.8 million b/doe—a level that was expected to be reached in the early 1980s. This policy tightening resulted mainly from the fact that large oil and gas reserves had already been discovered when OPEC quadrupled the price of oil in 1973; both factors magnified the potential impact of energy development and intensified fears of a disruptive effect on Norwegian society. In fact, a Finance Ministry study indicated that as many as one-fifth of the workers in traditional industries might be displaced (mainly because of the impact on the exchange rate) if North Sea development continued along its projected path. In addition, environmental concerns—already important in a country where the population is concentrated along the coast—were magnified by several major oil spills in other parts of the world. [REDACTED]

The go-slow policy was implemented primarily by means of a restrictive approach to licensing. Norway did not hold its first licensing round until 1965, by which time the United Kingdom was already carrying out its second round. By the end of 1965 Oslo had granted production licenses for only 78 North Sea blocks while London had licensed 475. Allowing for the fact that the Norwegian blocks are about twice as large, there was still approximately a 3-to-1 disparity in the total area licensed. [REDACTED]

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Table 5
Norway: Licensing Rounds ^a

	1 (1965)	2 (1969-71)	3 (1974-78)	4 (1979)	5 (1980-82)	6 (1981)	7 (1982)	8 (1983)	9 (1984)
Number of blocks offered	NA	68	32	15	26	13	12	40	24
Number of blocks applied for	NA	14	26	10	22	13	10	20	NA
Number of blocks licensed	78	14	8	8	12	9	5	15	NA
Number of companies licensed	10	9	6	6	4	7	5	NA	NA

^a Some licenses have been awarded outside of the regular licensing rounds:

- 1971—1
- 1973—2 (Statfjord)
- 1976—3 (approximately)
- 1978—1 (Gullfaks)
- 1982—1 (block 30/9)

Also in 1973 nine blocks were reserved for Statoil.

The disparity in licensing between Norway and the United Kingdom became even more pronounced in subsequent years. During 1966-79—despite growing oil company interest in the Norwegian sector of the North Sea—Oslo licensed only 45 more blocks. This figure includes a number of blocks that were allocated outside the three licensing rounds or that were reserved for the Norwegian state oil company. During the same period, the United Kingdom held four more licensing rounds and awarded 474 licenses.

Government Participation and Taxes. Over the years Oslo has substantially boosted its take from Norway's oil and gas sector by means of both direct participation and higher taxes. Beginning with the second licensing round in 1969, government participation—varying from 5 to 40 percent—in all licenses was required, using the “carried-interest” system. Under this system—a Norwegian innovation—the government does not participate in the development work but retains the right, once the field is declared commercial, to claim a share of the output by paying a corresponding share of the development costs. Since 1973 the level of government participation has varied from 50 to 80 percent, all in the hands of the state oil company—Statoil—which began operations in the same year.

The Norwegian tax system has been less subject to modification than that of the United Kingdom, although there have been several increases over the years. In 1972 the earlier flat 10-percent royalty was replaced by a sliding levy on oil production of between 8 and 16 percent (depending on the level of output) and a 12.5-percent charge on gas production. In 1975 a special petroleum tax was added; it currently is set at 35 percent of residual profits (after all other taxes are paid) less 6.67 percent of the capital expenditures made during the previous 15 years. Other taxes include the standard municipal tax of 23 percent of net income, federal taxes of 27.8 percent on net income less distributed dividends, and withholding taxes of 10 to 15 percent on dividends distributed abroad.

Changing Attitudes. Over the last five years Norwegian thinking has moved away from the go-slow approach to a significant degree—primarily, in our judgment, because actual oil and gas production has fallen far short of projections and has not had some of the negative consequences that the Norwegians feared. Instead of reaching the ceiling of 1.8 million

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b/doe, output in the early 1980s was only slightly more than half that figure. An additional important factor has been the emergence of a significant domestic industry engaged in offshore services and supplies—a sector with an obvious vested interest in maintaining a high level of oil and gas development. Along with this has come a growing demand from regions that have not particularly benefited from energy development thus far—primarily the northern half of the country—for a share of the jobs and industries that are being created. Finally, opposition from environmentalists has weakened because of the relative absence of problems thus far, while labor union objections to rapid energy development have been muted by a sharp rise in unemployment—even though the level is still low compared with most other West European countries. []

Energy policy disagreements between the Conservatives and the opposition Labor Party focus on areas other than the desirable level of oil and gas production. In particular, the Conservatives want to reduce the role of Statoil because of projections that the company might control 20 percent of Norwegian GNP by the turn of the century. The Labor Party favors a more powerful Statoil—able to compete effectively with the international oil companies—but has agreed to a compromise that will significantly reduce Statoil's revenues in the 1990s. Compared with the Conservatives, the Labor Party is somewhat more inclined to limit the amount of foreign participation in offshore operations. Under either party, however, Norwegian companies will play a major role in the future development of Norway's North Sea energy resources. []

Norway's changing attitude toward North Sea development was crystallized to a great extent in the Skanland Report, issued in early 1983. The report concluded that, rather than setting a specific production target, Norway should aim for a steady flow of net new investment in oil and gas production. This would result in a gradual rise in the level of gross investment because the requirement for replacement investment will increase over time. Under this approach, it is estimated that oil and gas production would gradually double to about 2.4 million b/doe in the late 1990s. The Skanland Report also advocated setting up a special fund to smooth out the economic

impact of energy production; in good years the government would transfer some oil and gas revenue to the fund and would draw from the fund when energy income declined. A member of the Labor Party's right wing and a director of the Bank of Norway, Hermod Skanland is widely respected in Norway. His basic conclusions have met with fairly broad approval and seem likely to be accepted by parliament as the basis for Norway's production policy. []

The Netherlands

The discovery of a major gas deposit at Groningen in the Netherlands in the late 1950s triggered the search for energy in the North Sea. Ironically, however, the Netherlands has fared relatively poorly in this search, as almost all major finds have been in the British or Norwegian sectors. Nevertheless, the limited success offshore has been more than offset by the emergence of Groningen as one of the largest gasfields in the world. []

Dutch energy policy is based on the Napoleonic *1810 Mining Law*, the *1958 Continental Shelf Mining Act*, and a 1965 amendment to the 1958 law. Gas and oil production—both offshore and onshore—is primarily in the hands of Netherlands Aardolie Maatschappij (NAM). Founded in 1947, NAM is a consortium of Shell Nederland (25 percent); Esso Holding Company, Holland (25 percent); and the Dutch Government (50 percent). Gas distribution and marketing within the country and—since 1975—gas export sales are in the hands of Gasunie, which is also a consortium, organized in the same way as NAM. The management of both companies is handled by Shell, which in turn is principally owned by the Dutch Government. []

Dutch energy policy in the 1960s evolved in the absence of some of the pressures that influenced government decisions in the other two energy producers. Unlike the case in the United Kingdom, the economy was generally perceived to be in good shape so The Hague did not feel pressured to speed gas production as a means of solving other economic problems. On the other hand, some of the objections

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to energy development that were important in Norway did not play a major role in the Netherlands. Onshore gas production posed relatively few environmental dangers and—with an economy that was larger and more diversified than Norway's—the Dutch were less afraid of potential disruptive effects of rapid energy development. []

In this situation the government's rapidly growing revenue needs became the dominant factor in energy decision making. The Hague had already begun to put in place a massive social welfare system, and gas production seemed to offer a relatively painless way of obtaining the funds required to finance it. Reinforcing this inclination was the widespread belief that gas left in the ground would be a declining-value asset. Rapid development of other energy sources—particularly nuclear power—was expected to undercut the market for gas in the future and hold down its price. []

Under these circumstances the Dutch Government set out—in the *Aardgas Nota (Natural Gas Note) of 1965*—an explicit policy of rapid gas exploitation. The Groningen gasfield, as well as any offshore oil and gas fields that might be found, were to be developed quickly. To provide a market for the gas, Dutch consumers would be encouraged to switch to the new fuel, and long-term export contracts would be signed with foreign buyers. To speed the search for energy in the North Sea, a liberal licensing regime was introduced. In the first licensing round (1967), over half the available concessions were licensed for a 15-year period with no requirements for government participation. Twenty-four additional licenses were granted during a second round (1970), and all but 20 percent of the remaining areas were allocated during a third licensing round (1972). Most of the concessions went to NAM. []

Although the offshore search effort proved disappointing, the Dutch goal of rapid gas development was basically met. Gas production—almost all from Groningen—rose from 24,000 b/doe (1.4 bcm) in 1965 to 1.1 million b/doe (66 bcm) in 1973. Almost half of the 1973 output was exported, while the gas consumed at home covered 47 percent of the country's total primary energy requirement. The increasing availability of relatively cheap Groningen gas particularly stimulated the growth of energy-intensive industry. From

1960 to 1973 industrial energy use in the Netherlands rose 270 percent while energy consumption in the rest of the economy increased only 160 percent. []

The 1973 oil embargo and oil price hikes sharply altered Dutch thinking on energy issues. The embargo highlighted the dangers of depending on imported energy and thus called into question The Hague's policy of rapidly depleting Dutch gas reserves. At the same time, the price hikes provided dramatic proof that energy prices could rise as well as fall. []

The rethinking of Dutch energy policy began with the 1974 *White Paper*, which called for energy conservation in general and reserving gas for "premium" uses. During 1974-77 The Hague took several steps to implement these principles, the most important of which was the decision not to renew gas export contracts when they expired (mostly in the late 1980s and early 1990s). The government also decided to phase out gas use in power stations and large industrial installations, moved to step up imports of oil and gas, began studying possible increases in the use of coal and nuclear power, and implemented several measures to promote energy conservation. []

The Hague's shift to a more conservative gas depletion policy was confirmed in a three-part Energy Memorandum published in 1979/80. The first part of the memorandum established conservation and diversification of energy sources as the basic objectives of Dutch energy policy, while the second and third parts called, respectively, for a sharp increase in the use of coal and for the construction of three large nuclear power plants. Also, in 1980 the government began renegotiating Dutch gas export contracts; the result was a significant increase in the base price and the introduction of a more complete indexation system—although Dutch gas prices have yet to catch up with oil prices. []

Since 1980, however, the pendulum has swung back toward a somewhat more liberal depletion policy. The main reason for the latest shift, in our judgment, is the fact that Dutch gas production fell more quickly

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than expected after 1979. Export sales were off particularly sharply because Dutch export contracts offer buyers an unusual degree of freedom to adjust the volume of deliveries, and the Netherlands thus bore the brunt of the recession-induced drop in West European gas purchases. In addition to increasing the life expectancy of Dutch reserves, the unexpectedly sharp drop in gas demand cut government revenue—just as the recession was forcing an increase in expenditures. Repeated attempts at budget tightening by several van Agt coalition governments, including the current center-right government, have failed to reverse the trend: the budget deficit has soared from 4.6 percent of GNP in 1980 to 8.0 percent last year. As a result, domestic pressure to increase gas sales, and thereby government revenues, has grown, although there are still political disagreements on the issue. On the left, the Socialists, and to a lesser extent the Democrats '66, tend to favor expanded exports to finance higher social spending and offset rising unemployment. On the right, the Christian Democrats and the Liberals are more inclined to slow depletion, curb spending, and hold the gas as a strategic reserve for Western Europe. Some also fear that increased gas sales will mean a larger government presence in the economy and will postpone needed industrial restructuring measures proposed by the van Agt government.

[REDACTED]

The net result of these pressures is that the Netherlands seems to be headed for a middle-of-the-road approach, between the earlier extremes of rapid depletion and strict conservation. About two years ago The Hague announced that gas not taken under existing export contracts could be delivered after the nominal termination dates of the contracts. Since there is likely to be a substantial quantity of such gas, due to the unexpected decline in demand after 1979, this decision amounted to a de facto extension of the contracts. Last year The Hague went a step further, announcing that additional quantities of gas would be made available for export—although the Netherlands and the gas-buying companies still must reach agreement on prices. The most likely result of these two moves is that Dutch gas exports will continue into the latter part of the next decade instead of terminating in the early 1990s.

[REDACTED]

The Economic Impact of Oil and Gas

On balance we judge that the development of oil and gas production has had a positive impact on the economies of the three countries—although probably not to the extent they originally had expected. On the plus side, energy production has boosted economic growth, strengthened the balance of payments, and provided a relatively painless source of government revenue. It has also added to economic security by reducing vulnerability to a cutoff of energy imports. On the other hand, the growth of energy production has hurt the traditional manufacturing sector in all three countries. The impact on employment is uncertain because gains in some areas have been offset by losses in others.

[REDACTED]

The impact of oil and gas on payments balances has been especially significant. Britain's energy trade deficit, which peaked in 1974 at \$9.0 billion, had disappeared by the end of 1980 and had turned into a \$10.7 billion surplus by 1983. Mainly on the strength of this turnaround, the current account balance moved from an average annual deficit of \$2.8 billion during 1973-76 to an average annual surplus of \$9.0 billion during 1977-83. Meanwhile, Norway's balance of trade shifted from a deficit of \$4 billion in 1977 to a \$4.3 billion surplus in 1983, with almost the entire improvement coming from greater oil and gas exports; the current account has been in surplus since 1979. Increased earnings from oil and gas have helped to finance imports of manufactures and have been used to spur capital investment in oil-related manufacturing industries. Buoyed by its gas sales, the Netherlands' current account has been in surplus for nine of the last 12 years, the cumulative surplus for the period totaling almost \$19 billion. Although an import surge and the second OPEC price hike pushed the current account into deficit during 1978-80, it has come back stronger than ever, with a surplus averaging \$4.1 billion annually since 1980.

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Table 6
West European Energy Producers: Oil and Gas in the Economy

	1974	1976	1978	1980	1981	1982
United Kingdom						
Gross production value of oil and gas (<i>million US \$</i>)	392	1,125	5,381	22,332	26,971	26,957
Share of GDP (<i>percent</i>)	0.2	0.5	1.7	3.9	4.5	4.8
Gross exports of oil and gas (<i>million US \$</i>)	1,649	2,135	4,384	14,510	18,746	19,016
Share of total exports (<i>percent</i>)	4.3	4.7	6.4	13.2	18.1	19.6
Government oil and gas revenue (<i>million US \$</i>)	42	137	1,079	9,031	13,084	13,671
Share of total government revenue (<i>percent</i>)	NEGL	1.6	2.5	13.6	17.0	17.3
Employment in oil and gas (<i>thousands</i>)	28	32	36	36	36	35
Share of total employment (<i>percent</i>)	0.1	0.1	0.1	0.2	0.2	0.2
Norway						
Gross production value of oil and gas (<i>million US \$</i>)	101	1,345	2,922	9,313	9,582	9,226
Share of GDP (<i>percent</i>)	0.5	3.8	6.0	14.4	15.3	15.0
Gross exports of oil and gas (<i>million US \$</i>)	88	1,220	2,593	8,381	8,378	8,285
Share of total exports (<i>percent</i>)	0.8	10.0	16.9	30.7	30.7	32.5
Government oil and gas revenue (<i>million US \$</i>)	NEGL	0.4	0.7	4.7	4.5	4.6
Share of total government revenue (<i>percent</i>)	0.2	3.1	4.7	18.4	18.1	19.5
Employment in oil and gas (<i>thousands</i>)	2	4	6	8	11	12
Share of total employment (<i>percent</i>)	0.1	0.3	0.4	0.5	0.6	0.7
Netherlands						
Gross production value of oil and gas (<i>million US \$</i>)	2,909	4,357	6,549	8,086	9,509	9,228
Share of GDP (<i>percent</i>)	4.5	4.9	5.3	6.5	7.5	7.5
Gross exports of oil and gas (<i>million US \$</i>)	1,459	1,899	2,701	5,095	5,340	4,987
Share of total exports (<i>percent</i>)	2.7	4.9	5.4	6.9	7.8	8.0
Government oil and gas revenue (<i>million US \$</i>)	1,117	2,597	4,742	7,018	7,734	7,998
Share of total government revenue (<i>percent</i>)	5.5	10.2	10.7	14.0	19.0	20.0
Employment in oil and gas (<i>thousands</i>)	5	5	6	7	8	8
Share of total employment (<i>percent</i>)	0.1	0.1	0.2	0.2	0.2	0.2

In the cases of Norway and the United Kingdom, the gain in the energy trade balance has been partially offset by a deterioration in the nonenergy trade balance, particularly for manufactured products. Over the last five years Norway's deficit in manufactures trade has averaged about \$2 billion per year greater than in the preceding five-year period. In the United Kingdom the shift was more dramatic as the balance on manufactures moved into the red for the first time ever in 1983. The \$7.2 billion deficit last year contrasts with a surplus on manufactures that averaged over \$8 billion annually during 1975-80. In

both countries the deterioration of the manufacturing trade balance probably reflects the fact that oil and gas production has generated new income—some of which will be spent on imports—and also probably caused the exchange rate to be higher than it otherwise would have been. In the Netherlands, where oil and gas account for a much smaller share of exports than in the other two countries, there has been no obvious negative impact on the manufacturing trade balance.

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Over the years, the three governments have taken a large and increasing share of total oil and gas income in the form of taxes, royalties, licensing fees, participation and marketing agreements, and profits of wholly and partly state-owned companies. Revenue from oil and gas production now accounts for close to one-fifth of total government receipts in each of the countries. In the United Kingdom, 1982 energy revenues totaled \$13.7 billion, or 17.3 percent of total government receipts. Norwegian taxes, royalties, and licensing fees amounted to \$4.6 billion in 1982 and accounted for 19.5 percent of total government income. In the Netherlands, gas revenues reached \$8 billion in 1982 and provided 20 percent of total government revenue. Unlike the United Kingdom and Norway, the Netherlands has no special energy taxes; The Hague's energy revenue arises largely from its government's share of Gasunie and NAM, participation agreements with private firms, and netbacks from producers. []

Energy production also appears to have boosted economic growth in the three countries, although the impact is impossible to quantify with precision. Last year oil and gas production accounted for 5.5 percent of GNP in the United Kingdom, 7.5 percent in the Netherlands, and 17 percent in Norway. The *net* additions to GNP are probably smaller, however, because some of the productive resources used in the oil and gas sector could have been utilized in other areas and because of the negative impact of oil and gas production on the manufacturing sector. []

We believe that a rough indication of the impact of oil and gas is the improvement in relative economic growth that all three countries registered after energy production got under way. The effect is most pronounced for Norway where we estimate that energy production added roughly 2 percentage points to the average annual GNP growth rate over a seven-year period. In the decade before significant oil and gas production began, the Norwegian economy grew at a 4.3-percent annual rate—exactly the same as the other West European OECD countries. During the years of expanding oil and gas production (1975-81), however, Norway grew twice as fast as the other group—4.1 percent annually versus 2 percent. Using the same methodology, we estimate that growing energy production added about half a percentage

Table 7
West European Energy Producers:
Economic Growth Before and After
Oil and Gas Production Began

	Norway	United Kingdom	Netherlands
Period before oil and gas production began	1965-74	1966-75	1958-67
Average annual real GNP growth during this period (percent)	4.3	2.3	4.5
Average annual real GNP growth for West European OECD (percent)	4.3	4.1	4.5
Growth differential (percentage points)	0.0	-1.8	0.0
Period of expanding oil and gas production	1975-81	1976-82	1968-77
Average annual real GNP growth during this period (percent)	4.1	1.2	4.3
Average annual real GNP growth for West European OECD (percent)	2.0	2.3	3.8
Growth differential (percentage points)	2.1	-1.1	0.5
Change in the growth differential (estimated impact of energy) (percentage points)	2.1	0.7	0.5

point annually to Dutch economic growth from 1967 to 1977 and almost three-fourths of a percentage point to the British growth rate from 1975 to 1982. []

Unfortunately, the benefits of oil and gas production have been at least partially offset by some negative effects. While these effects cannot be isolated from other negative influences—such as worldwide recession or restrictive government policy—they appear to be greatest in the Netherlands and smallest in Norway. The most important of the negative offsets is a

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decline in output and employment in the manufacturing sector. Even total employment may also be adversely affected in some cases, but this is much harder to establish. []

The negative impact on the manufacturing sector arises mainly because rising oil and gas earnings and resulting improvements in the current account cause the exchange rate to appreciate. The resulting decline in competitiveness leads to higher imports and reduced exports and eventually to declines in production and employment in export- and import-competing industries. A secondary impact is that the relatively high wages paid in the oil and gas industry have led workers in other sectors, backed by strong unions, to push for higher wages. This leads to further declines in price competitiveness, corresponding cuts in company profits, investment, and production and thus to a reduced manufacturing base. Finally, increased oil and gas production may have hurt other industries by diverting some of the investment funds that might otherwise have gone to them. These negative effects have been only partially offset by government efforts to promote domestic suppliers of equipment for the oil and gas sector. []

The manufacturing sector in all three countries performed relatively poorly during their periods of expanding energy production, although we cannot say how much of this is attributable to energy production. Dutch manufacturing GDP grew at a 2.3-percent annual rate during 1968-77, less than two-thirds the rate recorded in the other West European OECD countries, whereas previously it had grown at about the same rate. Over the same period the manufacturing share of total Dutch GDP fell 5.6 percentage points—the sharpest decline of any OECD member. In the United Kingdom, manufacturing GDP fell 2.1 percent annually on average during 1976-82, while it grew at a 0.9-percent annual rate elsewhere in the West European OECD. While this 3-percentage-point growth differential was about the same as in the preoil period, we believe Britain's performance would have been better in the absence of oil. In Norway, manufacturing output declined at an average annual rate of 1.6 percent during 1975-81, while it was growing at a 0.5-percent pace in the other group—a significant worsening of the previous growth differential. Over this period the combination of falling manufacturing

output and rising energy production caused the manufacturing share of GDP to fall from 21.9 percent to 14.8 percent. As was the case with the Netherlands a decade earlier, this was the biggest drop recorded within the OECD. []

The impact of expanding energy production on employment is less certain because there are offsetting influences. Employment in the manufacturing sector alone, however, probably has been adversely affected in all three countries. This was clearly the case in the Netherlands and the United Kingdom, where manufacturing employment fell by 16 percent and 25 percent, respectively, during the period of expanding energy production, although part of the British decline probably is due to the Thatcher government's efforts to restructure the industrial sector. Manufacturing employment also fell in Norway, but the decline was modest—less than that recorded by the other West European OECD countries during the same period. The loss of manufacturing jobs was not offset by the relatively small number of jobs created in the capital-intensive energy sector. On the other hand, the boost that energy production gives to overall economic growth may lead to substantial job creation in the services sector, and thus to a net increase in total employment. This probably accounts for at least part of the 17-percent gain in Norwegian employment during 1975-81, versus a 2-percent rise for the other West European OECD countries. Many of these jobs were created in Norway's public sector and were financed out of the sharp rise in government oil and gas revenue (or, initially, by borrowing against the anticipated rise in revenue). In the Netherlands total employment growth just matched that of the other West European OECD countries while energy production was expanding. As for the United Kingdom, total employment dropped 5.7 percent during 1976-82, but again it is impossible to say how much of this decline was due to Thatcher policies and the world economic recession. On balance, we judge the net employment effect to have been positive in Norway, approximately neutral in the Netherlands, and negative in the United Kingdom. []

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A final problem is that of pollution. Only a few major spills have occurred in the North Sea, but recent reports by the Norwegian and British Governments show concern that aging equipment and faster development could portend a severe accident in the next decade. Such an accident could cause major damage to the domestic fishing industry and high cleanup costs. Thus far, the governments' response to the potential crisis has been to tighten environmental regulations and safety requirements on new and existing fields. The Norwegians have the most elaborate controls for North Sea operations and have an active agency with the power of law behind it. The Netherlands, only recently expanding its North Sea operations, has yet to develop an effective pollution and environmental control program. [REDACTED]

Outlook

Although long-term energy forecasts are inherently shaky, we believe it is fairly certain that Western Europe will continue to rely on imports for 40 to 50 percent of total energy supplies through the end of the century and beyond. As a result, the region will remain vulnerable to supply disruptions, especially if energy markets tighten in the early 1990s as most forecasters expect. Among the three main West European energy producers, Norway's relative importance will increase as its oil and gas production continues to expand, while output in the United Kingdom and the Netherlands probably will decline. [REDACTED]

There is no doubt that imports will continue to supply the great majority of Western Europe's oil needs well into the next century. While there is a wide range of forecasts, the consensus probably is that the region's oil-import dependence in the year 2000 will be higher than the 1983 figure of 70 percent. Consumption could begin growing again, reflecting the resumption of economic growth and the sharp fall in real oil prices over the last few years. Indigenous oil production, meanwhile, probably will be somewhat lower in the year 2000 than it is now, as increases in Norway fail to fully offset declines in the United Kingdom. While London's recent moves to stimulate North Sea development will boost oil production in the 1990s above what it would have been otherwise, we doubt that the current level of output can be maintained. [REDACTED]

The outlook for gas is even more uncertain than that for oil, the key question being how Western Europe will cover its gas needs in the 1990s and beyond. The rise in gas consumption that began in 1983 is continuing this year, and most forecasters project a further substantial increase by the end of the century. At the same time, production from most existing fields will decline as the fields approach exhaustion. Production from the giant Groningen gasfield is also expected to decline by the year 2000, because Dutch policymakers still intend to phase out exports long before the field is exhausted, holding the remaining gas for Dutch use and as an emergency reserve for Western Europe. [REDACTED]

While Dutch willingness to continue gas exports past the early 1990s has provided a little more breathing space, Western Europe is still almost certainly going to need a major new source of gas by the end of the century. The region's principal hope for covering its projected gas deficit from indigenous sources lies in the development of Norway's offshore Troll field. Projected production increases from other smaller fields currently under development will offset only part of the projected decline in West European gas production. Troll, on the other hand, is a giant field—comparable to Groningen—whose production potential has been estimated as high as 40-50 billion cubic meters per year (670,000 to 830,000 b/doe). [REDACTED]

To develop Troll, a number of technical problems must be resolved—in particular how to work a field that is in an inhospitable area with water depths of 300 meters or more, roughly twice the depth of any offshore fields now in operation. Although the oil companies are confident that the problems can be overcome, the cost and the time required are uncertain. The consensus seems to be that eight to 10 years of work will be required before production can begin, and at least several more years before full output is achieved. Thus, even if development began now, it would be near the turn of the century before Troll could make a major contribution to West European gas supplies. [REDACTED]

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The major obstacles to Troll development are its cost and the competing objectives of the parties involved. The operator of the Troll field—Royal Dutch Shell—will not proceed with full-scale development until there is a firm sales contract for the gas at a price that will cover projected costs. The gas buyers, on the other hand, will want flexible prices and delivery schedules. They are afraid of being stuck with unmarketable gas if oil prices and gas demand do not rise as expected—and they are well aware of how inaccurate long-term energy forecasts can be. Finally, the Norwegian Government has grown accustomed to taking a major share of the revenue from oil and gas projects and obviously wants to do the same with Troll. []

Western Europe's major alternative to Troll gas is the USSR. With their enormous reserves and their need for foreign exchange, the Soviets undoubtedly will be willing and able to provide large additional amounts of gas. There is still some export pipeline capacity that has not been contracted for, and, more important, the Soviets could relatively easily construct one—or more—additional export pipelines in a fraction of the time that it would take to develop Troll. In addition, Moscow almost certainly will be able to undercut the prices offered by Norway or any other potential suppliers. []

While the West Europeans would not be totally sanguine about increasing their dependence on Soviet gas, neither will they rule out this alternative. We believe that they could reconcile—to their satisfaction, at least—increased imports of Soviet gas with their IEA commitment to avoid “undue dependency” on any single energy supplier. In the view of most West Europeans, their critical import dependency is on OPEC, not the USSR. They would point out that West European imports of Soviet oil probably will decline sharply by the mid-1990s, due to the USSR's expected slippage in oil output and its rising domestic demand. In this situation Western Europe could sign another major deal for Soviet gas and still hold its energy dependence on the USSR in the next decade below the current level.³ The new Soviet pipeline will be able to deliver 29 billion cubic meters of gas annually, slightly more than the 27 bcm that the

USSR sold to Western Europe last year. With the new pipeline in full operation by 1990, Soviet gas could then account for about 22 percent of Western Europe's gas consumption and 3.5 percent of its total energy consumption. If another pipeline of the same size were constructed by the mid-1990s, these figures would rise above 30 percent and 5 percent, respectively. []

The West Europeans also clearly believe that the Soviets have been reliable trade partners in the past and that Moscow would have too much at stake—in the form of foreign exchange earnings and its good reputation as a trade partner—to use gas as a foreign policy lever. They would also be likely to argue that buying Soviet gas would help hold down oil prices, and that, even if an embargo were imposed, they could cope with it reasonably well by a combination of fuel switching, conservation, and increased imports of Dutch gas. In this connection, we believe the gas-buying companies probably would be willing to help the Dutch with the costs of maintaining a capability to boost gas production substantially on short notice. The West Europeans would feel even more secure with Norwegian gas, of course, and probably would pay a premium to obtain it—but not a very large premium, we suspect. Other potential gas suppliers (such as Iran or Nigeria) probably could not compete with the Soviets in terms of price and would be regarded by the West Europeans as involving a greater security risk than the USSR. []

Negotiations on Troll gas are expected to begin next year. If the West Europeans are to turn to this source, rather than the USSR, Oslo, Shell, and the gas-buying companies will have to work out a mutually satisfactory agreement reasonably soon—the longer they delay the greater the chance that the Soviets will get the market by default. While all three parties want Troll to proceed, they all have other alternatives. Royal Dutch Shell's future as a profitable energy company would not be jeopardized by failure to develop Troll, and the gas-buying companies know that they can turn to the USSR if Troll negotiations break down. Oslo's alternative probably would be to

³ Its vulnerability to an energy embargo might be higher, however, because of the greater difficulty of dealing with a gas cutoff. []

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concentrate on oilfield development for the time being, with the hope that a better deal for Troll gas could be negotiated a few years down the road after energy markets begin to tighten. Meanwhile, for the last two years Norwegian officials have sought to strengthen Oslo's hand in the upcoming Troll negotiations by publicly stressing the security advantages to Western Europe of buying Norwegian gas. []

An agreement to develop Troll will probably also require Dutch willingness to cover any gas shortfalls before the field comes on line. The Hague's recent easing of export policy represents a big step in this direction, and we believe it eventually will go further, for several reasons:

- The decline in demand for Dutch gas since 1979 means that existing export contracts could be continued until the turn of the century and still leave the Dutch in the year 2000 with approximately the level of reserves that they originally had planned.
- Eliminating gas exports would force some difficult adjustments on the Dutch economy because of the large negative impact on the trade balance and on government revenue. We believe the government will come under increasing pressure to delay this adjustment phase, particularly in view of its recent lack of success in reducing its huge budget deficit.
- The Hague is likely to feel increasing pressure from the gas-buying countries to extend the contracts for the sake of West European and EC solidarity. []

In our view, Oslo will have to show the most flexibility if a deal for Troll gas is to be worked out. It will have to offer the gas at a price that will always remain below the energy-equivalent oil price, and to do this it will have to accept a less burdensome tax regime for Troll, perhaps based less on royalties and more on profits. In part this judgment simply reflects Oslo's bargaining disadvantage vis-a-vis the gas companies, who have an alternative supplier while Oslo has no serious alternative buyer. It also reflects the different economic circumstances associated with Troll. North Sea oil and gas fields developed to date have been a financial bonanza for the Norwegian Government—development and production costs have been so low that Oslo has been able to claim approximately half of

the gross sales revenue and still leave the producing companies enough to cover costs and make a comfortable profit. Because of its higher production costs, Troll gas appears uncompetitive in the current energy market—but mainly because government royalties and taxes more than double the projected cost of bringing the gas to market. Energy industry analysts now seem fairly confident that an easing of the tax system would make Troll gas competitive while still providing large revenues for Oslo. []

There are several factors that we believe could push Oslo to make some price concessions on Troll gas. The first is that Troll would still be a boon to the government and to the Norwegian economy even if it does not generate tax revenue at the same rate as earlier fields. Another factor is Norwegian fear that Troll gas could be shut out of the West European market if development does not begin soon. If gas demand in the region grows faster than expected, the gas-buying companies could be forced to turn to the USSR as the only supplier capable of delivering the gas quickly enough to meet their needs. The third positive factor is the widespread expectation that world energy prices will be substantially higher by the end of the century. Such a rise in energy prices would greatly boost Troll's attractiveness for all concerned: the buyers could get their gas at a price well below the energy-equivalent cost of oil but high enough to pay good profits to the companies and still leave a large chunk of revenue to be claimed by the Norwegian Government. []

Oslo has in fact already shown some signs of becoming more flexible in its negotiating strategy. Over the past year, for example, it has eased its tax regime on the Ekofisk field to spur production and it also moderated its price demands for the sale of gas from the Sleipner field to the United Kingdom. More recently, a Norwegian official told a US Government representative that Oslo was determined to see Troll developed. He stated that Oslo's strategy was to force the oil companies to minimize the development costs for the field. Once that was accomplished, the government would show sufficient flexibility on the tax issue to ensure development took place. []

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